Amendments to the Claims:

Please cancel claims 1-20 and 35-51 as indicated by the following listing of claims, which replaces all prior versions, and listing of claims in this application.

1. - 20. (Canceled)

21. (Original) An apparatus comprising:

a microfluidic flow channel network formed in a first elastomer layer, the microfluidic flow channel network comprising a first set of inlet branches in fluid communication with a junction and with a reagent source, a second set of inlet branches in fluid communication with the junction and with a buffer source, and a mixing structure in fluid communication with the junction and with an outlet;

a first control channel network formed in a second elastomer layer adjacent to the first elastomer layer, the first control channel network adjacent to the first inlet branch set to define a first multiplexer structure configured to flow a select reagent into the junction; and

a second control channel network formed in the second elastomer layer, the second control channel network adjacent to the second inlet branch set to define a second multiplexer structure configured to flow a select buffer into the junction.

22. (Original) The apparatus of claim 21 wherein the junction comprises a second flow channel intersecting a first flow channel at first and second points separated by a distance.

23.. (Original) The apparatus of claim 22 wherein the first flow channel is branched along the distance.

24. (Original) The apparatus of claim 21 wherein the mixing structure comprises a closed circuit configured to be isolated from the junction and the outlet.

25. (Original) The apparatus of claim 21 wherein the mixing structure comprises a substantially circular shape.

26. (Original) The apparatus of claim 21 wherein the flow channel network further comprises an injector channel in fluid communication with the mixing structure.

27. (Original) The apparatus of claim 21 wherein the second elastomer layer defines at least three control channels overlying the flow channel network to define a peristaltic pumping structure configured to flow fluid through one of the first inlet branch set, the second inlet branch set, and the closed circuit.

28. (Original) The apparatus of claim 21 further comprising a sample storage structure in fluid communication with the outlet and configured to retain a sample from the mixing structure.

29. (Original) The apparatus of claim 28 wherein the sample storage structure comprises an elongated flow channel.

30. (Original) The apparatus of claim 29 wherein the elongated flow channel is dead-ended.

31. (Original) The apparatus of claim 30 wherein an end of the elongated flow channel opposite the inlet is gated by a valve.

32. (Original) The apparatus of claim 31 further comprising a multiplexer structure governing fluidic access to the elongated flow channel.

33. (Original) The apparatus of claim 29 wherein the storage structure comprises an array of storage vessels connected by rows and columns of flow channels.

34. (Original) The apparatus of claim 33 wherein the array of storage vessels comprises paired vessels in fluid communication through a valved connecting channel.

35. - 51. (Canceled)